Chapter 6.5 PUBLIC HEALTH/AQUATIC LIFE CONCERNS

Increasingly, the DEQ is addressing the role toxicants play in reducing water quality in state waters and supports programs to monitor, evaluate, and reduce toxicity to aquatic life and human health. Many of the programs in place at DEQ that address toxicity in state waters are described and discussed throughout this report.

The toxic pollutants that were monitored during the reporting period include toxic organics, metals and pesticides. Information on the state's monitoring programs and the results of this monitoring for toxics in water column, fish tissue, and sediment is provided in Chapter 2.1 of this report. A discussion of the methodology used to determine elevated levels of toxicants is provided in Chapter 2.2.

Fishing Advisories and Restrictions

The Virginia Department of Health (VDH) Division of Health Hazard Controls has sixteen health advisories, limiting fish consumption, and one restriction, prohibiting consumption, currently in effect. A fishing restriction allows sport fishing within the affected area, but the taking of fish for human consumption is prohibited. A health advisory warns of potentially dangerous levels of contamination found in fish tissues in an affected area and in most cases, limits consumption but does not prohibit it. Under health advisories, the population at risk and a safe maximum consumption rate may be specified. These areas are described below.

Kepone in the Lower James River

From 1966 through 1975 Allied Chemical Company and its subsidiary Life Science Products, Inc. produced a persistent chlorinated hydrocarbon insecticide called Kepone. During production, an estimated 90,720 kg of Kepone was released to the environment through atmospheric emissions, wastewater discharges, and bulk-disposal of off-specification batches. The James River and its tributaries from Richmond to Newport News were contaminated with Kepone. In 1975, the entire James River from the fall line at Richmond to the Hampton Roads/Norfolk Bridge Tunnel, including all tributaries, was closed to the taking of any shellfish and/or finfish because of Kepone. From 1975 through 1988 various Kepone bans were in place. In 1988, all James River fishing restrictions due to Kepone were allowed to expire as Kepone levels in fish remained below the U.S. Food and Drug Administration (FDA) action level of 0.30 ppm. This area is currently under a contaminant advisory, covering the mainstem James River and all tributaries from the fall line at Richmond to the Hampton Roads-Norfolk Bridge Tunnel. This advisory does not limit or restrict the consumption of fish from this part of the river. The waterbodies affected by this health advisory are: VAT-G11, VAT-G10, VAP-G08, VAP-G07, VAP-G04, VAP-G03, VAP-G02, VAP-G01, and VAP-J15.

DEQ has continually monitored Kepone levels in the James River since its identification in 1975. The major areas of concern were Kepone levels in the water column, finfish, and sediment of the James River and its tributaries, and in the ground water in Hopewell. After continuous non-detectable results, water column monitoring was discontinued in 1981. Kepone levels in finfish, ground water, and sediment have decreased since the onset of the problem. The VDH has established a level of concern of 0.30 ppm Kepone in fish-filet samples. No fish-filet samples from this section of the James River have exceeded this level since 1996.

Mercury in the North Fork Holston River

Eighty miles of the North Fork Holston River in southwestern Virginia were contaminated with mercury by releases from the Olin manufacturing operation in Saltville. Although the chemical plant closed in 1972, mercury levels in fish in this section of the river remain elevated above levels seen upstream and the consumption of fish from this area is prohibited. Catch-and-release fishing is allowed. This health restriction includes waterbodies VAS-013, VAS-O12, VAS-O11, and VAS-010. DEQ fish tissue monitoring data from 1997 and 2002 showed no fish samples contained mercury at concentrations greater than the FDA action level for mercury (1.0 ppm) or the DEQ water quality standard based fish tissue value (WQS TV) for mercury (1.1 ppm), but some samples of rock bass were above the Virginia Department of Health's level of concern of 0.5 ppm for mercury.

Mercury in the South River and the South Fork Shenandoah River, North Fork Shenandoah and the Shenandoah

Mercury was released by E. I. DuPont de Nemours and Company, a synthetic fibers plant in Waynesboro,

into the South River and South Fork Shenandoah River from 1929 to 1950. The contamination was discovered in 1977 and was found to have contaminated 103 river miles, from the plant to the Page/Warren county line. These areas remain under health advisories for fish consumption due to mercury contamination. The VDH recommends that no fish other than stocked trout should be eaten from the footbridge at the DuPont plant in Waynesboro downstream to the confluence with the North River at Port Republic. For the South Fork Shenandoah from Port Republic to the Riverton dam on the North Fork and downstream in the Shenandoah River to the Warren Power dam just north of Front Royal the VDH recommends that no more than two meals (1/2 pound) per week of fish from these waters be consumed. Small children and pregnant women are advised not to consume any fish containing mercury. Several species of fish in these waters show mercury concentrations higher than the Virginia Department of Health's level of concern of 0.5 ppm as well as the DEQ WQS TV of 1.1 ppm. This health advisory is located in all or a portion of waterbodies, VAV-B40, VAV-B38, VAV-B37, VAV-B35, VAV-B33, and VAV-B32.

Mercury in Swamp Waters

In October 2003, the VDH established fishing advisories due to elevated mercury levels detected in fish-tissue in top level predator fish species for three swamps or blackwater rivers where there is no known significant anthropogenic source of mercury contamination. These water bodies share natural, physical characteristics of low pH, high organic content and still or slow moving current which promote the natural methylation of mercury into the highly bioaccumulative compound methyl-mercury. Increased natural production of methyl-mercury increases the possibility that the mercury content of fish will increase especially in upper-level predators. Similar elevated levels of mercury in piscivorous species of fish have been noted in similar habitats in the southeastern United States as well as lakes, bogs and wetlands in New England and Wisconsin and Minnesota. In many of these areas there are no known sources of mercury. Deposition of air-born mercury has been identified as a possible source of the mercury to the swamp water, where methylation takes place resulting in bioaccumulation up the food chain resulting in elevated levels of mercury in the piscivorous fish. This is considered a possibility in these swamp waters in Virginia also. DEQ will investigate this possibility as well investigating other possible sources of mercury to these water bodies. DEQ will initiate additional monitoring of fish in these areas to better understand the extent of the elevated mercury concentrations.

The VDH began in 2001 to use a concentration of 0.5 ppm methylmercury in fish tissue as to trigger issuing a fishing advisory (previously VDH had used the FDA action level of 1.0 ppm). This lower concentration of 0.5 ppm is based on assuming a fish consumption rate of two eight-ounce meals per month as an exposure rate for triggering a fishing advisory. This fish consumption rate is a greater rate of consumption than is used as the basis of the Virginia water quality criteria (6.5 g/day, or about one meal per month). Virginia water quality standard based fish tissue value (WQS TV) for mercury is higher at 1.1 ppm. Although some species of fish in these waters exceed the VDH level of concern of 0.5 ppm, most fish samples do not exceed the Virginia water quality standard based fish tissue value of 1.1 ppm. Prior to 2001, fish-mercury concentrations at 1.0 ppm or below would not have resulted in fishing advisory. This new, lower concentration of concern for mercury is causing DEQ to increase our investigations of fish-mercury issues.

The fishing advisories issued in 2002 due to mercury are:

Mercury in the Dragon Swamp /Piankatank River

From Rt. 603 downstream approximately 19 miles, the advisory affects largemouth bass and recommends eating no more than two eight-ounce meals per month and women who are pregnant or may become pregnant, nursing mothers and young children should not eat any fish contaminated with mercury from these waters. Affected waterbodies are VAP-C02R, VAP-C02E and VAP-C03E.

Mercury in the Great Dismal Swamp Canal

From Deep Creek Lock south to the Virginia/ North Carolina state line, including the feeder ditch to Lake Drummond. The advisory affects bowfin and chain pickerel and recommends eating no more than two eight-ounce meals per month and women who are pregnant or may become pregnant, nursing mothers and young children should not eat any fish contaminated with mercury from these waters. The affected waterbody is VAT-K39.

Mercury in the Blackwater River

From State Rt. 460 downstream to the Virginia North Carolina border (approximately 40 miles). The advisory affects largemouth bass and redear sunfish and recommends eating no more than two eight-ounce meals per month and women who are pregnant or may become pregnant, nursing mothers and young children should not eat any fish contaminated with mercury from these waters. Affected waterbodies are VAT-K33 and VAT-K36.

PCBs in the South Fork Shenandoah River, North Fork Shenandoah River and Shenandoah River

The VDH has issued a public health advisory warning against the consumption of fish taken from the South Fork Shenandoah River. The advisory extends from the State Route 619 bridge downstream to the Shenandoah River headwaters. It continues from the North Fork Shenandoah River at its confluence with Passage Creek downstream to the Shenandoah River; and from the Shenandoah River from the confluence of the North and South Fork Shenandoah Rivers to the Virginia/West Virginia state border. This covers approximately 45 stream miles. This advisory was issued after DEQ monitoring revealed PCB levels in fish tissue samples above the 2.0 ppm FDA action level. The advisory states that fish caught in these waters should not be consumed. The source of this contamination has been identified as Avtex Fibers Front Royal Inc. This plant closed in 1989 following revocation of their VPDES permit. This health advisory is located in waterbodies VAV-B58, VAV-B57, VAV-B55, VAV-B51, VAV-B41.

PCBs in the Roanoke River

In July 1998 a health advisory for fish consumption has been issued for a 50-mile stretch of the Roanoke River running through Cambell, Charlotte, Halifax and Pittsylvania counties. Polychlorinated biphenyls, commonly known as PCBs, have been detected in fish tissues of striped bass, white bass and carp. The advisory area begins at Seneca Creek at Route 704 near Long Island and continues downstream to the point where a pipeline intersects Route 803 and where Route 633 in Charlotte County crosses the Roanoke River (approximately 5.4 river miles below the route 360 bridge). People should eat no more than two eight-ounce meals a month of these fish species. These meal estimates are based on the possibility that eating PCB-contaminated fish may increase the risk of cancer in humans. A source of the contamination has been identified but other sources are suspected. In December 1999, the VDH expanded this fish advisory to include 29 additional miles upstream including Altavista to the Leesville Dam. Affected waterbodies are VAW L-19, VAW-L30, VAW-L31, VAP-L36, VAP-L38, VAP-L40, VAP-L75 and VAP-L80.

DEQ fish-tissue monitoring data from 2002 showed that flathead catfish collected from the Roanoke River near Hardy contained total PCBs at levels that exceeded the Virginia Department of Health's level of concern. In October 2003, the VDH issued a fishing advisory for a section of the Roanoke River from the Niagara dam downstream to a point in the Smith Mountain Lake approximately 2.5 miles downstream of the Rt. 634 bridge. This fishing advisory recommends eating no more than one eight-ounce meal per month of flathead catfish from this advisory area. Affected waterbodies are VAW-L07 and VAW-L12.

PCBs in the Dan River

In December 1999, a health advisory for fish consumption was issued for a 42 mile stretch of the Dan River from Kerr Reservoir at Staunton River State Park to southwestern Halifax County where the river crosses into North Carolina, north of Virginia Route 62. Polychlorinated biphenyls (PCBs) have been detected in seven fish species collected in the South Boston, Virginia area. Flathead and channel catfish were the only species determined to have levels of PCBs in the tissue above 600 ppm, the VDH level of concern. The advisory cautions people to eat no more than two eight-ounce meals a month of flathead and channel catfish taken from the advisory area. Pregnant women and children are advised not to eat any of these fish. Affected waterbodies are VAW-L60, VAP-L62, VAP-L64 and VAP-L73.

PCBs in the Potomac River

A health advisory for fish consumption has been issued for a 33-mile stretch of the Potomac River from the Woodrow Wilson Bridge to Bent Point at the mouth of Aquia Creek. The advisory states “channel catfish larger than 18 inches caught in the tidal areas in several tributaries flowing into the Potomac River near Quantico, VA

may pose a potential public health risk". Since most of this area is in Maryland, the VDH has not posted any warning signs.

PCBs in the Levisa River

A health advisory for fish consumption has been issued for a 12-mile section of the Levisa River from Grundy, VA to the Kentucky state line. This advisory recommends that no fish of any kind be eaten from that section of the Levisa River. The waterbody affected is VAS-Q08.

PCBs in Bluestone River

In August 2001, the VDH issued a health advisory for fish consumption for a section of the Bluestone River from the Route 460-bridge crossing south of Bluefield downstream to the Virginia/West Virginia state line near the town of Yards in Tazewell County. The advisory applies only to carp due to elevated levels of PCBs detected in samples collected in 2000 by DEQ. The advisory states that "carp caught in these waters should not be consumed". The waterbodies affected are VAS-N36and VAS-N37.

PCBs in New River

In August 2001, the VDH issued a health advisory for fish consumption for a section of the New River from the Route 114-bridge crossing north of Radford field downstream to the Virginia/West Virginia state line near the town of Glen Lyn. The advisory applies only to carp due to elevated levels of PCBs detected in samples collected in 2000 by DEQ. The advisory states that "carp caught in these waters should not be consumed".

PCBs in James River

In July 2001, the VDH issued a health advisory for fish consumption for a section of the James River from the Interstate 95 bridge in Richmond down stream approximately 43 miles. The advisory affects blue catfish and carp and recommends people do not eat any blue catfish and only two eight-ounce meals per month of carp from the advisory area. Women, who are pregnant or may become pregnant, nursing mothers and young children should not eat any blue catfish or carp taken from these waters. DEQ intends to conduct additional investigations in this area to better determine the extent of the concern and to try to find the source of the contamination. Affected waterbodies are VAP-G01E, VAP-G02E and VAP-G03E.

PCBs in Knox Creek

In May 2002, the VDH issued a health advisory for fish consumption for a section of Knox Creek from the Virginia/Kentucky state line upstream to its headwaters. The advisory recommends eating no more than two eight-ounce meals per month of any fish taken from the advisory area and women who are pregnant or may become pregnant, nursing mothers and young children should not eat any fish taken from these waters. DEQ intends to conduct additional investigations in this area to better determine the extent of the concern and to try to find the source of the contamination. The affected waterbody is VAS-Q03.

PCBs in Beaver Creek

In May 2002, the VDH issued a health advisory for fish consumption for a section of Beaver Creek from the Beaver Creek Lake Dam downstream to the Virginia/Tennessee state line in Bristol. The advisory recommends eating no more than one eight-ounce meal per month of any fish taken from the advisory area and women who are pregnant or may become pregnant, nursing mothers and young children should not eat any fish taken from these waters. DEQ intends to conduct additional investigations in this area to better determine the extent of the concern and to try to find the source of the contamination. The affected waterbody is VAS-O07.

Shellfish Condemnations

The VDH has prohibited and/or condemned harvest of approximately 80 square miles of productive shellfish areas in the waters of Virginia. Another 3 square miles have been seasonally condemned, which restricts direct harvesting from 1 April to 31 October of each year. These areas are all located in the Chesapeake Bay and Tidewater areas of the state, and include waters surrounding certain point source discharges, as well as areas

with elevated fecal coliform bacteria concentrations or other problems. Shellfish may be harvested from most restricted areas; however, they must first be relayed to approved waters for depuration for 15 days before marketing. Relaying is only allowed when the water temperature is above 50°F. The taking of shellfish is prohibited in three bodies of water: the Elizabeth and Lafayette Rivers, both within the lower James River subbasins; and Little Creek in the Small Coastal and Chesapeake Bay Basin.

Fish Tissue Contamination

- Routine and Special Study Fish Tissue Data.

This section summarizes the fish tissue contaminant data collected, analyzed and/or evaluated during the period covered in this report. The data were collected via DEQ's routine five-year rotational monitoring of fish and sediment samples for contaminant analysis in the state river basins (see Chapter 2.1for details about this program), as well as from follow-up and special monitoring studies conducted once the routine program identified potential problem areas. The data reviewed for this report covers data collected from 1993 through 2000. Fish-tissue concentration data for routine monitoring conducted in the years 1997-2002 are posted on the DEQ web site at **www.deq.state.va.us/fishtissue/html**. All of these data have been reviewed by the VDH.

- Screening Value Exceedences.

The monitoring station data list found on the DEQ website at http://www.deq.virginia.gov/wqa includes the approximately 460 stations that DEQ sampled in its routine rotational river basin monitoring program (including follow-up monitoring) between 1995 and 2002. It also tabulates the number of exceedences of human health screening values for those routine monitoring stations where there were exceedences for one or more contaminants in edible fish fillets or shellfish. Contaminant screening values are computed using EPA risk assessment techniques for non-carcinogen and carcinogen effects and are based on the same fish tissue concentrations that are the basis for the numerical water quality criteria that are designed to prevent fish contamination. These stations were not randomly selected. Instead, many of the stations were targeted for sampling because of potential or known water pollution problems identified via a search of historical data and reports.

- Selection Basis for Stations Discussed.

This report summary highlights those stations where current contaminant levels alone or in combination with other data and studies were:

at a Virginia Department of Health ("VDH") level of concern for human health requiring a fish consumption advisory or advisory extension (see page 6.5-2), or

at a VDH or DEQ level of concern requiring special follow-up studies (most are listed at http://www.deq.virginia.gov/water/reports.html, or

below levels of concern where VDH determined that an existing fish consumption advisory could be lifted due to a decline in levels of contamination. A complete list of fish advisories in Virginia can be found at **http://www.vdh.state.va.us/HHControl/fishing_advisories.htm**

During this period DEQ and the VDH were also able to complete risk evaluations at several sites reported for ongoing or future evaluation in previous editions of this report. These decisions are included in this report in order to finalize the information on previously reported potential human health concerns. This report does not highlight station exceedences where VDH determined at the time of data review that no further action was needed unless these stations were monitored as a follow-up to a VDH request for additional sampling.

Lead

- No Current EPA Screening Value for Lead in fish tissue.

The specific toxicological information needed to calculate a screening value is not available for lead at this time and EPA does not have a screening value for lead in fish tissue. Therefore, DEQ cannot use a screening

value to assess the data for lead found in fish tissue. To address this issue, DEQ reports any concentration of lead detected by our contract analytical lab to the VDH for its review and recommendations. To address this unusual situation in this report, all instances of lead detected at any concentration in fish tissue are noted in the monitoring station data list found on the DEQ website.

- 1993 - 1994 Lead Data Suspect Due to Lab Problems.

Previous 305(b) reports noted that lead had been detected in at least some of the fish samples at each station sampled in 1994 as well as in 1993, and that follow-up work was planned. Upon further investigation, DEQ identified detection limit problems at the contract laboratory. This made all of the lead concentrations for the 1993 - 1994 fish tissue samples suspect. Therefore, these lead concentrations were not used in the assessment of the 1993-1994 data and are not included in the monitoring station list associated with this report as an exceedence. Furthermore, VDH did not consider the concentrations for the suspect lead data to be at levels of concern. In 1995 DEQ switched to another contract lab capable of detecting metals and organics at lower detection limits. Lead was detected in less than 4 percent of fish analyzed between 1995 and 1998. When DEQ resampled one of the 1994 stations with suspect lead levels (Mattaponi River) in 1996, lead was reported below detection limits (<0.1 ppm).

- VDH Requests for Follow-up Sampling.

In subsequent monitoring years (1995 – 1998) covered by this report, lead was detected at 15 river basin stations. Of these 15 stations, VDH asked DEQ to follow-up with additional sampling at two sites sampled in 1997 (Kiptopeke State Park and Bagwell Creek). These two stations were resampled in 2000 and lead was not detected in any fish samples from Bagwell Creek. Lead was detected at the detection level of 0.1 ppm in only one of six fish samples (gray trout) at Kiptopeke State Park. These data were reported to the VDH and they did not recommend any further action.

Polychlorinated Biphenyls (PCBs)

- Shenandoah River and South and North Forks of the Shenandoah River Fish Consumption Advisory.

VDH reviewed the fish-PCB data collected in 1996 and 1999 from stations on the Shenandoah River and South and North Forks of the Shenandoah River that contained PCBs above the VDH level of concern. Because these fish were from areas currently subject to a fishing advisory established in 1989, VDH determined that no further action was needed.

- Roanoke (Staunton) River Fish Consumption Advisory.

Data collected by DEQ in 1993 during a special Roanoke (Staunton) River basin study led VDH to issue a fish consumption advisory in 1998. The area covered by the advisory was expanded in 1999 in response to additional DEQ sampling data indicating levels above the VDH level of concern of 600 parts per billion. (See page 2.5-3 of this report and the DEQ web site for additional information). DEQ is now focusing on identification of potential point sources for the contamination.

- Dan River Fish Consumption Advisory.

Data collected by DEQ in 1999 from the Dan River showed elevated levels of PCBs in some species of fish from some areas of the river. On December 27, 1999 the VDH issued a fish consumption advisory for the Dan River from the Virginia /North Carolina border (north of the VA Route 62) downstream to the Kerr Reservoir at the Staunton River State Park. The fish consumption advisory applies to flathead catfish and channel catfish and recommends that pregnant women and children do not eat these species and that others limit their consumption to two eight-ounce meals a month.

- Levisa Fork Fish Consumption Advisory.

In 1997 DEQ included a station on the Levisa Fork at the state line in its routine river basin rotational sampling because PCBs had previously been detected in fish at this location. Three out of four of the fish species samples collected at Levisa Fork in 1997 exceeded the 600 parts per billion level of concern for PCBs established

by VDH for issuing fish consumption advisories. The VDH issued a fish-eating advisory for a 12-mile stretch of Levisa Fork in 1999 (See page 2.5-3). In response to a request from VDH, DEQ conducted a special fish and sediment study in Levisa Fork in 2000 in an attempt to bracket the extent of fish contamination. The VDH reviewed these new data and determined that the only fish that exceeded their level of concern were from areas currently subject to a fishing advisory, therefore VDH determined that no further action was needed at that time. Results of the 2002 DEQ fish tissue monitoring prompted the VDH to modify the existing fishing advisory to apply to all fish in this section of the river.

- Deep Creek Follow-up Sampling.

VDH asked DEQ to resample Deep Creek (Southern Branch of the Elizabeth River) in 2000 because a gizzard shad sample collected at that station in 1998 exceeded the screening value for PCBs. DEQ had also conducted a special study in the Elizabeth River in 1993 and these stations are listed in Appendix B. PCB levels in all species collected at the Deep Creek station in 2000 except gizzard shad were below the VDH 600 ppb level of concern. VDH has reviewed the recent monitoring data and since gizzard shad is not the type of fish that people commonly eat, determined that no further action is warranted at this time. Additional DEQ sampling in the Elizabeth River system was conducted in 2001. Analytical data from these 2001 fish samples were received by DEQ from the lab in the summer of 2002. These 2001 fish-contaminant data were being reviewed by DEQ and the VDH to determine the need for appropriate follow-up action.

- Four Mile Run Special Study.

Samples were collected in Four Mile Run during October 1997 in response to concerns about run-off problems from the nearby Potomac Yard in Northern Virginia. The local Health department made the request for the special study via the DEQ Northern Regional Office in response to citizen concerns. VDH reviewed the data results and determined that the level of contaminants (PCB, total chlordane and total PAH) posed no significant risks to human health.

- James River 1997 Fish Study of PCB Levels.

The US Fish and Wildlife Service had expressed concern due to the presence of PCBs in fish tissue from the James River (River Miles 76.0 -69.0) and the DEQ's "low" priority designation during its review of DEQ's final 303(d) TMDL (Total Maximum Daily Load) Priority List for 1996. The Service also expressed concern that the area was a roosting habitat for the bald eagle and limited fish tissue data were available for the river segment. In addition, DEQ-Piedmont Regional Office ("PRO") staff identified high concentrations of polychlorinated terphenyls (PCTs) in sediment in Bailey Creek. So in 1997, 45 fish tissue samples were collected from seven stations in the James River and its tributaries in the vicinity of Hopewell. The study was a joint effort between DEQ-PRO and Central Office Staff, and involved tissue and sediment collections. These samples were analyzed for PCBs, PCTs, and chlorinated pesticides. Thirty-five of the 45 fish tissue samples had PCB levels in excess of the DEQ screening value; however, only one sample had a PCB concentration above the VDH advisory level. Fish tissue data were transmitted to PRO staff during November 1998. During early December 1998 PRO staff made a data report presentation to other DEQ staff and VDH personnel. An old landfill in Hopewell was identified as the source of PCB and PCT to the James River system. At PRO's request, USEPA Superfund monitoring staff sampled the landfill area and creek running through it in January 1999 and determined that the site contamination was not sufficient to warrant Superfund cleanup. EPA found PCTs upstream of the landfill and suggested that old industrial sources might be contributing to the contamination. At the request of the industry, PRO sampled stormwater outfalls at the headwaters of the creek for PCTs and PCBs in May 1999. PRO found PCTs in the 1 to 5 ppm ranges and PCBs in the 0.2 to 1.6 ppm range in sediments. These results were below the clean-up requirements of EPA Superfund, and the case was considered resolved pending further information. VDH has asked DEQ to resample Bailey Bay in 2001 or 2002. DEQ resampled Bailey Bay in 2001. Analytical data from these 2001 fish samples were received by DEQ from the lab in the summer of 2002. DEQ and the VDH reviewed these 2001 fish-contaminant data to determine the need for appropriate follow-up action. After reviewing the data, the VDH issued a fishing advisory in July 2001. This fishing advisory is described above in the section on fishing advisories and restrictions. DEQ is continuing to sample additional fish from this section of the James in 2002 and 2003 to investigate this matter further.

- Revisit Potomac River Fish Consumption Advisory Area.

The fish consumption advisory for the Potomac River is described on page 6.5-3. At the request of VDH, DEQ resampled the Potomac River and Virginia tributaries in 2000. Some carp and channel catfish samples from the Potomac embayment stations had PCBs higher than the VDH 600 ppb level of concern for PCBs. However, all these stations are within sections of the river where a fish consumption advisory is already in effect. Therefore, based on the year 2000 monitoring data, the VDH has determined that no further action is warranted at this time.

- Mountain Run and Bull Run.

During this period the DEQ completed follow-up monitoring of fish and sediment from Mountain Run and Bull Run. Latest sampling results in 1999 found PCBs and PAHs in the fish but not at the VDH levels of concern.

- New River Fish Consumption Advisory Area.

Based on data from fish collected by DEQ in 2000, on August 6, 2001 VDH issued a fish advisory for the New River from the Rt. 114 bridge north of Radford to the Virginia-West Virginia State line. This new fishing advisory applies only to carp and recommends that no carp be consumed from the affected portion of the river. Based on DEQ data collected in 2000 and discussions with VDH, DEQ collected additional samples from the New River in October 2001 at the following locations; downstream of Claytor Lake dam, downstream of Radford, near Whitethorne, near Pembroke and at Glen Lyn. Additional sampling to gain additional data in this section of the New River was performed for 2002. The VDH reviewed these data and determined that no adjustments were required to the fishing advisory issued in August 2001.

- Bluestone River Fish Consumption Advisory Area.

Based on data from fish collected by DEQ in 2000, on August 6, 2001 VDH issued a fish advisory for the Bluestone River from the Rt. 460-bridge crossing south of Bluefield to the West Virginia State line. This new fishing advisory applies only to carp and recommends that no carp be consumed from the affected portion of the river. Based on our data collected in 2000 and discussions with VDH, DEQ re-sampled this area on the Bluestone River near the sewer plant road, near Rt. 17, and near the town of Yards in 2002. The VDH reviewed these data and determined no adjustments were required to the fishing advisory issued in August 2001.

Mercury

- North Fork Holston.

A station on the North Fork of the Holston River exceeded the screening value for mercury in 1997. This area was already under a long-term fish consumption advisory prohibiting the taking of fish from these waters for human consumption due to historical mercury contamination from a Superfund site, described on page 2.5-2. DEQ fish tissue monitoring data from 1997 and 2002 showed no fish samples contained mercury at concentrations greater than the FDA action level for mercury (1.0 ppm) or the DEQ water quality standard based fish tissue value (WQS TV) for mercury (1.1 ppm). However, some samples of rock bass were above the Virginia Department of Health's level of concern for mercury of 0.5 ppm.

- Shenandoah River Mercury Monitoring.

DEQ's Valley Regional Office has an ongoing monitoring program for mercury in fish tissue, water and sediment in the South River and South Fork Shenandoah River. There have been restrictions or health advisories on consumption of fish from portions of the South and South Fork Shenandoah Rivers since the 1970s (see page 2.5-2). A fishing advisory in some form has been in place for some portions of this river system since the 1980s. The mercury contamination originated from historic practices at the E.I. DuPont Plant in Waynesboro. In a settlement between DuPont and the Commonwealth in the early 1980s, a trust fund was established to support monitoring in the river for a projected 100-year period. Fish were most recently sampled in 1996, 1999 and 2001. The results are available on the DEQ web site at http://www.deq.virginia.gov/rivers/mercury.html. The VDH has evaluated all these data as well as recent recommendations from the National Academy of Sciences regarding mercury toxicity and assumptions of fish consumption rates. Based on their review, the VDH has changed their guidelines for issuing fishing advisories for mercury and has lowered their level of concern from 1.0 ppm to 0.50 ppm mercury. This is based on a new assumption of two 8-ounce meals a month, while the old screening value was based on approximately one meal per month. Based on the new, lower level of concern for mercury the VDH

determined that the existing fish consumption advisory should remain in effect and be expanded into some additional portions of the river system. The revised advisory also contains updated recommendations on the amounts of fish that can safely consumed in different sections of the rivers. The VDH stated that this action was not due to changes in mercury levels in the fish but was due to the VDH "lowering the amount of mercury recommended for fish consumption to provide more protection to the public". More information can be found at www.vdh.state.va.us/news/fish3.htm. DEQ continues to monitor mercury contamination in this river system through regular meetings with stakeholders, review of literature, and communications with other experts in the field. Additional fish tissue monitoring for mercury contamination in this river system is planned for 2002

- Dragon Swamp.

Based on mercury levels detected in fish collected during the routine rotational river basin sampling in 1998, VDH requested that DEQ resample the site in 2000. One of seven species tested at this site in 2000 exceeded the VDH screening value of 0.50 ppm. This 2000 datum was for a largemouth bass at 0.59 ppm; in 1998 the largemouth bass sample was analyzed at 1.9 ppm. DEQ sampled the site again in 2002. As a result of the 2002 DEQ sampling the VDH issued a fishing advisory for largemouth bass for a section of the Dragon Swamp. This is discussed above in the section on fishing advisories and below under "mercury in swamp waters".

- Tennessee/Big Sandy River Basin.

The VDH had concerns about mercury concentrations in whole fish from two stations (Cranes Nest River and J. W. Flannigan Reservoir) sampled during the DEQ 1991 coalfields study. However, VDH could not draw any significant conclusions on associated health risks from the whole fish data. DEQ resampled these two stations in 1997 for mercury analysis of edible fillets. VDH has reviewed the data from 1997 and determined that the reported levels were not at a level of concern and that no additional sampling from these sites was necessary.

Mercury in Swamp Waters

In recent years there has been increasing interest in mercury contamination in fish tissue. A number of studies around the country, from the Everglades through the swamps of the southeastern United States as well as in lakes, bogs and wetlands in New England, Wisconsin and Minnesota have shown that top level predator fish species analyzed in these habitats frequently contain elevated levels of mercury. A number of these studies show that there are no known local source of mercury in these areas and suggest that deposition of air-born mercury is a suspected source of the mercury. These water bodies share natural, physical characteristics of low pH, high organic content and still or slow moving current which promote the natural methylation of mercury into the highly bioaccumulative compound methyl-mercury. Increased natural production of methyl-mercury increases the possibility that the mercury content of fish will be elevated, especially in upper-level predators. This emerging realization that some waterbodies may be naturally more prone to elevated levels of bioaccumulative mercury, along with the new, lower fish-mercury concentration that is now being used by the VDH as an acceptable level of mercury in fish-tissue has prompted DEQ to investigate potential mercury contamination more closely.

DEQ has traditionally focused the fish tissue-monitoring program to monitor sites with suspected sources of pollution and apparently unpolluted habitats like swamps were given low priority for monitoring. In order to investigate the new concern for this swamp water mercury methylation issue, DEQ has begun to sample these habitats in more areas where there are no known or suspected sources of mercury but where the environmental conditions are favorable for mercury methylation. As a result of this sampling in 2002, elevated levels of mercury were discovered in top-level predator fish species in three swamps or blackwater rivers.

In October 2003 the Virginia Department of Health established fishing advisories due to elevated mercury levels detected in fish-tissue in top-level predator fish species for three swamps or blackwater rivers. These fishing advisories are for the Dragon Swamp /Piankatank River, the Great Dismal Swamp Canal and the Blackwater River. These fishing advisories are described in more detail in the section on fishing advisories.

Similar elevated levels of mercury in fish-eating species of fish have been noted in similar habitats in the southeastern United States as well as lakes, bogs and wetlands in New England and Wisconsin and Minnesota. In many of these areas there are no known sources of mercury. Deposition of air-born mercury has been identified as a possible source of the mercury to the swamp water, where methylation takes place resulting in bioaccumulation up the food chain resulting in elevated levels of mercury in the fish-eating fish. This is

considered a possibility in these swamp waters in Virginia also. DEQ will investigate this possibility as well investigating other possible sources of mercury to these water bodies. DEQ will initiate additional monitoring of fish in these areas to better understand the extent of the elevated mercury concentrations.

The Virginia Department of Health uses a level of concern of 0.5 ppm mercury in fish tissue to trigger issuing a fishing advisory. This is based on assuming a fish consumption rate of two eight-ounce meals per month. However, this is a greater rate of consumption than is used as the basis of the Virginia water quality criteria (6.5 g/day, or about one meal per month) and the Virginia water quality standard based fish tissue value (WQS TV) for mercury is higher 1.1 ppm. Although some species of fish in these waters exceed the VDH level of concern of 0.5 ppm, most fish samples do not exceed the Virginia water quality standard based fish tissue value of 1.1 ppm.

DDT/DDE

- Two Lakes at Tidewater Community College.

The DEQ Waste Division requested VDH review of DDT/DDE concentrations in whole fish collected from two Tidewater Community College lakes at a Superfund site. The VDH preferred edible fillets but found that even the concentrations in the whole fish were below levels of concern. At the request of citizens, DEQ collected fish from the two lakes for analysis of edible fish fillets in 2000 and the VDH has reviewed these data and determined that the low concentrations in the fish present no health risks.

Dioxin

- Blackwater and Nottoway Rivers.

Due to dioxin contamination by the Union Camp Company in Franklin, Virginia, a fish-eating advisory was issued by the VDH in 1990 for portions of the Blackwater and Nottoway Rivers. Union Camp subsequently changed its process operations. At the request of the VDH, DEQ sampled one station each in the Blackwater and Nottoway Rivers in late 1997 for dioxin levels in fish. The results verified similar findings by Union Camp Company that the dioxin levels in the fish were below the VDH level of concern, and the advisory was lifted by VDH on March 26, 1998.

Kepone

- James and Chickahominy Rivers.

Every two years, DEQ, in consultation with the VDH, collects fish for kepone analysis from the James River downstream of Hopewell and the in the vicinity of the mouth of the Chickahominy River and in the Hampton Roads area. Nine of the 253 fish samples collected and analyzed in 1994 exceeded the FDA action level of 0.3 ppm. In 1995 one sample out of 260 exceeded the 0.3 ppm action level. Since 1995, none of the edible fillet samples from the annual collections has exceeded the FDA action level.

Tributyltin

Surface water samples were collected and analyzed by the Applied Marine Research Laboratory at Old Dominion University for the determination of the concentration of tributyltin (TBT) at one station in the Hampton Roads Harbor area and eleven stations in the Elizabeth River area of the lower James River. The samples were collected during six monitoring events over the period of June 1993 to March 1995. In-stream concentrations were compared to the Virginia Water Quality Standard for TBT in saltwater surface waters (VR680-21-01.13) which are not at any time to exceed 0.001 parts per billion (ug/l) TBT. The station in the Hampton Roads Harbor area did not exceed the standard. Six of the eleven stations in the Elizabeth River area exceeded the standard for TBT. The distribution of stations exceeding the TBT standard are as follows: three stations in the Elizabeth River main stem, one station in the Eastern Branch Elizabeth River, and two stations in the Southern Branch Elizabeth River. The exceedences occurred in segments that support considerable commercial vessel traffic with TBT hull coatings.

- Relationship between *Pfiesteria* and water quality

The 2002 water quality assessment included the sampling and analysis for a microorganism ***Pfiesteria piscicida.*** This microorganism has been linked to extensive fish kills in North Carolina estuaries. Leading experts from North Carolina State University and the Florida Department of Environmental Protection as well as other scientists have not identified the toxic microbe in samples from Virginia. However, *Pfiesteria piscicida* was found in several Maryland rivers with fish kills during the summer of 1997. No confirmed cases were found in the waters of Virginia during the 1999 summer season and at this time, DEQ has reserved judgement on water quality issues associated with *Pfiesteria*.

Once a fish kill involving lesions is reported and if *Pfiesteria piscidia* is considered a possible cause, DEQ will collect water samples for oxygen and other chemical parameters along with actual fish samples. Water samples are sent to Old Dominion University (ODU) for analysis and fish samples are sent to Virginia Institute of Marine Science (VIMS).

- Reporting fish kills or fishes with lesions

DEQ has responsibility for investigating fish kills in Virginia waters. Call 1 (800) 592-54VA to be directed to the appropriate regional office.

For any health related concerns, call the VDH hotline at 1 (888) 238-6154.